STUDIES IN HUMAN INHERITANCE XXVII

THE INHERITANCE OF THE SHAPE OF THE SELLA TURCICA[1]

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The shape of the sella turcica as seen in X-ray pictures varies from circular through oval to flat or saucer-like. Almost nothing is known as to the possible genetic basis for such differences in shape. Dillon and Gourevitch (1934, 1936) observed the variation in sella form in 26 pairs of twins, 14 fraternal and 12 identical, and concluded that these variations were chiefly influenced by genetic factors. Maguid (cited by Dillon and Gourevitch) compared four pairs of identical twins with four pairs of fraternal twins, and found striking similarities in sella shape in the identicals and marked differences between the members of the pairs in the fraternal group.

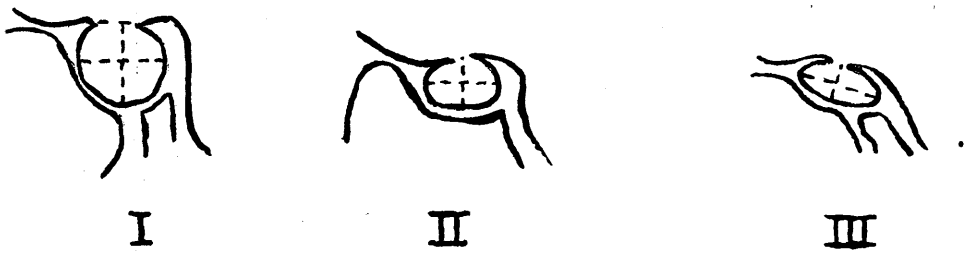

FIG. 1. Diagrammatic representation of the three shapes of sella turcicas. I, round; II, oval; III, flat.

In the course of a genetic investigation of the variation of pneumatization of mastoids, configuration of sinuses, and form of sellas, we have taken standard X-ray pictures of parents and children. In a preceding paper (Snyder and Blank, 1944) we presented evidence that bridged sella is inherited on the basis of a dominant gene substitution. It is the purpose of this paper to present the results of our analysis of sella shape based on X-ray pictures of 100 individuals belonging to 24 families.

Knowledge of the possible genetic factors underlying sella shape may be of practical as well as theoretical importance, since the size and shape of the pituitary gland is obviously proportional to the form of the sella turcica which houses it. The secretory function of the gland may or may not be related to its size and shape, but the genetic study of such conditions as Froehlich's disease, Simmond's disease, adiposity and short stature requires a better knowledge of variation in the sella turcica than we now possess.

The X-ray pictures were taken in the standard position for lateral radiography of the sella turcica. The work was done at St. Francis Hospital, Columbus, Ohio. The distance was in all cases the same and was sufficiently great to avoid distortion.

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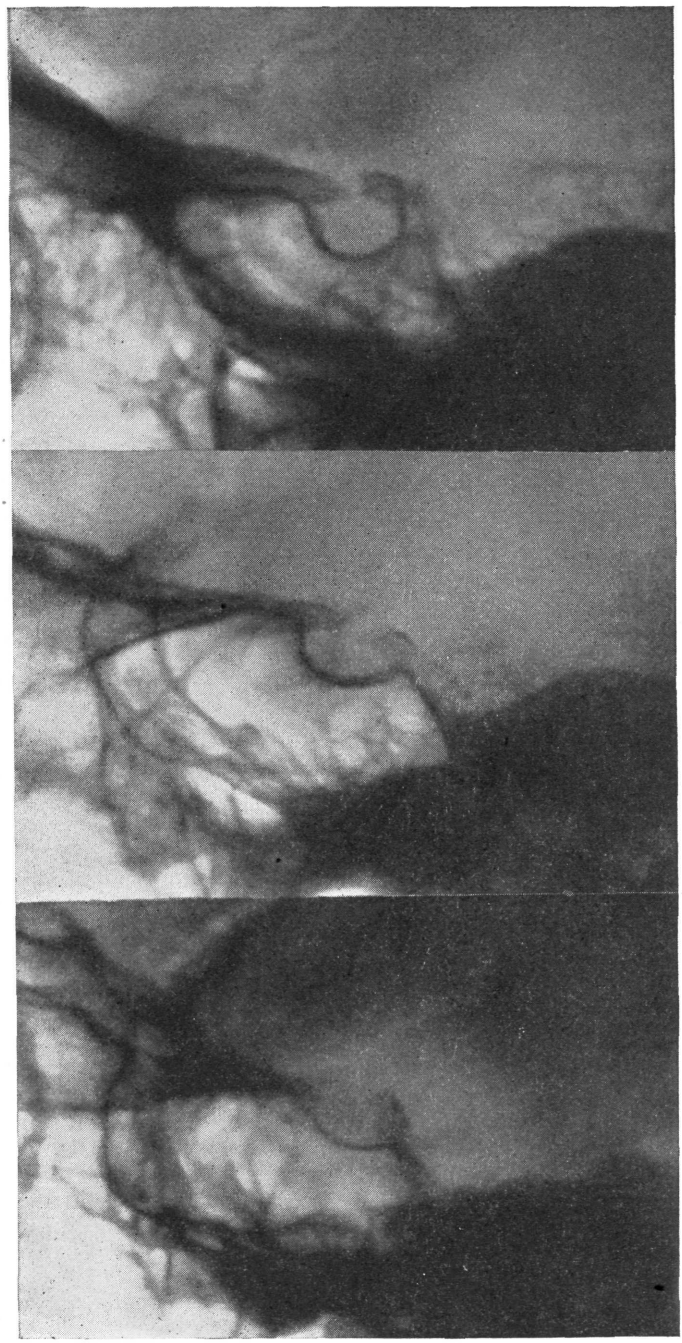

FIG. 2. X-ray photographs of the three types of sella turcicas. Upper, round; middle, oval; lower, flat.

The sellas were measured in two dimensions: saggittal, the maximal anterior-posterior distance, and vertical, the distance from the middle of the base to a line connecting the tips of the anterior and posterior clinoid processes (Fig. 1). It was found that the ratios between width and height fell into three rather sharply defined groups with very little grading from one to the other (Fig. 2). The three groups were as follows:

I circular; width to height being about 1 : 1.
II oval; width to height being about 1.5 : 1.
III flat; width to height being about 2 : 1.

The proportions of the three groups in our one hundred cases were as follows: type I, 41 per cent, type II, 50 per cent, and type III, 9 per cent. These proportions differ somewhat from those reported by Koehler (1928) on 500 X-ray pictures of normal European individuals, where the figures were type I, 24.4 per cent, type II, 58.4 per cent, and type III, 17.2 per cent. It would not be surprising to find racial and group differences in sella shape as have been found in skulls.

The types of mating in our material and the offspring from these types are as follows:

Mating Type	No. of Families	Offspring		
		I	II	III
I x I	3	6	.....	.....
I x II	11	12	11	1
I x III	1	4	.....	.....
II x II	5	.....	10	.....
II x III	4	.....	5	3
III x III	.....	.....	.....	.....

It is clear that there is a correlation between types of parents and types of offspring. However, with the small number of individuals a trustworthy estimate of the association can not be obtained. The data are highly suggestive, and indicate the action of Mendelian factors in the production of sella shape. The collection of further data seems justified, and it is hoped that these studies, interrupted by the exigencies of the war, may be continued when the opportunity again presents itself.

Unusually small sellas were encountered in two families. In one family the mother and both of her sons showed the trait; in the other, the father and one of two sons had the small sellas.

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